HIGH-RESOLUTION LASER SPECTROSCOPY OF THE $S_1 \leftarrow S_0$ TRANSITION OF FLUORENE AND CARBAZOLE

SHUNJI KASAHARA, *Molecular Photoscience Research Center, Kobe University, Kobe, Japan*; SHINJI KURODA, *Graduate School of Science, Kobe University, Kobe, Japan*; SHOYA UEDA, *Undergraduate, Kobe University, Kobe, Japan*.

Rotationally-resolved high-resolution fluorescence excitation spectra of the $S_1 \leftarrow S_0$ electronic transition of fluorene and carbazole have been observed. Sub-Doppler excitation spectra were measured by crossing a single-mode UV laser beam perpendicular to a collimated molecular beam. The absolute wavenumber was calibrated with accuracy 0.0002 cm^{-1} by measurement of the Doppler-free saturation spectrum of iodine molecule and fringe pattern of the stabilized etalon. For fluorene, 7 bands were observed and analyzed from the 0_0^0 to $0_0^0 + 1228$ cm^{-1} band, and their molecular constants were determined with high accuracy. For carbazole, 3 bands were observedand analyzed from the 0_0^0 to $0_0^0 + 1122$ cm^{-1} band, and their molecular constants were also determined. Yi *et. al.* [a] were reported the lower vibronic bands for both molecules, and their molecular constants are good agreement with the obtained ones except the $0_0^0 + 204$ cm^{-1} band of fluorene. We found a typical local energy shift in this $0_0^0 + 204$ cm^{-1} band, and it was identified as originating from the perturbation between the vibronic levels in the S_1 state. The Zeeman effect were also observed up to 1.2 T for the 0_0^0 bands to consider the excited state dynamics.

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[a] J. T. Yi, L. Alvarez-Valtierra, and D. W. Pratt, *J. Chem. Phys.*, **124**, 244302 (2006).